Discussion Document on the Phosphorus Standard Established in the Proposed Regulations
Virginia Department of Conservation and Recreation
September 5, 2008

Overview

This document outlines the background and compiles the rationale supporting the establishment of a 0.28 lbs/acre per year phosphorus standard in the Virginia Soil and Water Conservation Board's draft proposed regulations. Much of the information outlined below was presented to and discussed with a Part II Subcommittee of the first Stormwater Technical Advisory Committee (TAC) on August 16, 2006 and again on September 21, 2006. A technical workgroup was assembled and discussed the issue further on October 12, 2006. It was determined by the members of the subcommittee and the full TAC that the rationale for establishing the 0.28 standard was technically sound.

Background

As part of the Chesapeake Bay 2000 Agreement, Virginia committed to removing water quality impairments in the Chesapeake Bay, including its tidal tributaries, caused by nitrogen, phosphorus and sediment pollution. Additionally, Virginia developed water quality standards (dissolved oxygen, chlorophyll-a, and clarity) for the Chesapeake Bay and its tributaries that incorporated the Chesapeake Bay commitments into the Commonwealth's regulatory framework. Under the Agreement, Virginia received an allocation for the amount of nitrogen, phosphorus and sediment that the Commonwealth could discharge and still meet the Chesapeake Bay water quality standards. Virginia's allocations for annual nitrogen and phosphorus loads are as follows:

	Total for Chesapeake Bay	Virginia Allocation
Nitrogen	175 million pounds	51.4 million pounds
Phosphorus	12.8 million pounds	6.0 million pounds

Subsequently, Virginia developed and adopted plans, called Tributary Strategies, which identify implementation actions necessary to meet the nitrogen and phosphorus load allocations and achieve the Chesapeake Bay water quality standards. These plans address each of the major land uses and discharges contributing to the water quality impairments. Implementation of the Tributary Strategies is tracked on an annual basis and is compiled with data from other Chesapeake Bay jurisdictions to help evaluate progress in achieving the pollution load allocations.

Stormwater is a major source of nitrogen, phosphorus, and sediment to many local streams and rivers statewide. Furthermore, developing lands is the only land use category in Virginia that continues to expand. In the 2007 Chesapeake Bay Progress Assessment, stormwater runoff comprised 21.5% of the nitrogen load and 21% of the phosphorus load delivered from Virginia to the Chesapeake Bay. This represented a marked increase since 1985 when stormwater runoff comprised only 12 and 16 percent, respectively. Over the last twenty years, as development has increased in Virginia, pollution loads from stormwater runoff, per the assumptions of the Bay model, have increased, while pollution loads from other major sources, such as wastewater discharges and agriculture, have declined. While the Commonwealth has spent considerable time, programmatic focus, and expense addressing nutrients coming from wastewater discharges and agriculture, this regulatory action is one of the first key steps in addressing the increasing impacts from stormwater.

Virginia Stormwater Regulations – Derivation of Standards

In order to fulfill its water quality commitments and to address increasing water quality challenges across the Commonwealth, Virginia is strengthening its stormwater requirements. To do this, Virginia is developing numeric phosphorus criteria both for new development on undeveloped land and for redevelopment of existing developed lands. The goals for each category of development are as follows:

> New development goal – Avoid causing or contributing to water quality impairments by achieving reductions in phosphorus and nitrogen loads for undeveloped land consistent with the loadings identified in Virginia's tributary strategies.
>
> Redevelopment goal – Achieve significant reductions in phosphorus and nitrogen loading without discouraging redevelopment.

Based on discussions with the first TAC and its subcommittees, the standards that were established for new development on undeveloped land were 0.28 lbs/acre per year phosphorus and 2.68 lbs/acre per year nitrogen [NOTE: At the September 10th TAC meeting the members requested a clarification that although there may have been agreement to the approach to arrive at these numbers at that time, there was not consensus around them being an achievable standard until tested]. For redevelopment, a 44% phosphorus load reduction and a 28% nitrogen load reduction from the pre-existing site condition were established. These were based on the following computations:

Virginia Stormwater Regulations
Basis for Water Quality Criteria *

Re-development

	Nitrogen	Phosphorus
2002 Urban Load (lbs)	19,460,534	1,930,567
Trib Strategy (TS) Urban Load (lbs)	14,084,699	1,078,779
Urban Load Reductions (lbs)	5,375,834	851,787
% Urban Load Reduction	28%	44%

Undeveloped Land

TS Non-Urban Land Load (lbs)		
Agriculture	13,394,506	2,237,091
Forest	13,840,691	178,037
Mixed Open	5,461,103	1,002,976
Total	32,696,300	3,418,104
TS Non-Urban Land (acres)		
Agriculture	2,257,957	2,257,957
Forest	8,594,702	8,594,702
Mixed Open	1,356,512	1,356,512
Total	12,209,171	12,209,171
Average TS Non-Urban Load (lbs/ac)	2.68	0.28

* Tables outlining the summary loadings are attached in Appendix A.

TP: 3,418,104/ 12,209,171 = 0.28 lbs/acre per year
TN: 32,696,300/ 12,209,171 = 2.68 lbs/ acre per year

Continuing discussions with the current TAC have currently resulted in the selection of 0.28 lbs/acre phosphorus per year for new development and a 20% reduction in phosphorus load from redevelopment as the statewide water quality standards [NOTE: At the September 10th TAC meeting the members requested a clarification that consensus around these standards does not yet exist]. The 44% calculation from the Tributary Strategies was reduced to a 20% standard in order to minimize barriers to redevelopment. The single statewide standard for phosphorus was selected for determining compliance with the stormwater regulations for the following reasons:

- To base the criteria on the reductions needed to achieve the Chesapeake Bay water quality standards.
- To remedy and prevent statewide water quality impairments, both within and outside the Chesapeake Bay Watershed.
- To simplify compliance calculations, thereby facilitating implementation for both permit applicants and local program administrators.
- To provide an equitable approach across Virginia jurisdictions so that no locality had a competitive advantage over another.
- In recognition that nitrogen removals from implementation of stormwater BMPS can still be accounted for, even if they are not subject to compliance criteria.

Appendix A

Virginia
Tributary
Strategies
s56prog02 - 2002 Annual Model Assessment w/o Urban Stream Restoration - FINAL (12/18/2003)
Edge of Stream
Loads

		MAJOR_LAND_USE						
BASIN	Data	AGRICULTURE	ATDEP WATER	FOREST	MIXED OPEN	POINT SOURCE	URBAN	Grand Total
esva	Sum of ACRES	77,605	3,937	80,119	17,648	-	10,594	189,904
	Sum of TP (LBS/YR)	152,860	2,230	2,023	16,742	30,505	12,264	216,625
	Sum of TN (LBS/YR)	1,438,377	38,423	116,652	80,551	164,332	162,653	2,000,988
jame	Sum of ACRES	1,057,990	70,587	3,955,903	655,878	-	767,535	6,507,893
	Sum of TP (LBS/YR)	1,971,128	39,979	115,910	859,599	1,697,886	1,200,316	5,884,818
	Sum of TN (LBS/YR)	11,800,676	742,759	7,997,782	4,064,747	16,346,952	10,056,157	51,009,074
potm	Sum of ACRES	1,082,637	21,350	1,601,925	281,956	-	626,294	3,614,162
	Sum of TP (LBS/YR)	1,446,980	12,092	29,860	166,555	535,532	510,045	2,701,066
	Sum of TN (LBS/YR)	12,192,523	210,983	2,417,706	1,320,587	9,194,242	6,216,433	31,552,475
rapp	Sum of ACRES	485,928	10,783	899,168	199,710	-	114,170	1,709,759
	Sum of TP (LBS/YR)	621,689	6,107	21,712	141,883	64,625	102,666	958,682
	Sum of TN (LBS/YR)	5,359,951	111,543	1,714,969	932,728	610,175	1,452,508	10,181,874
york	Sum of ACRES	309,799	29,376	1,189,538	278,288	-	98,893	1,905,894
	Sum of TP (LBS/YR)	459,632	16,638	29,907	240,389	163,320	105,274	1,015,160
	Sum of TN (LBS/YR)	4,503,807	303,061	2,026,025	1,520,653	1,189,749	1,572,782	11,116,077
Total Sum of ACRES		3,013,960	136,033	7,726,653	1,433,479	-	1,617,486	13,927,612
Total Sum of TP (LBS/YR)		4,652,290	77,047	199,411	1,425,168	2,491,868	1,930,567	10,776,350
Total Sum of TN (LBS/YR)		35,295,334	1,406,770	14,273,134	7,919,268	27,505,450	19,460,534	105,860,489

Virginia Tributary Strategies
s74vats04 - Virginia Tributary Strategies 2004 - FINAL (9/14/2004)
Edge of Stream Loads

		MAJOR_LAND_USE						
STATE_BASIN	Data	AGRICULTURE	ATDEP WATER	FOREST	MIXED OPEN	POINT SOURCE	URBAN	Grand Total
VA_esva	Sum of ACRES	54,906	3,937	101,324	19,691	-	10,046	189,904
	Sum of TP (LBS/YR)	52,573	2,230	1,737	12,265	1,846	7,030	77,681
	Sum of TN (LBS/YR)	513,856	32,572	113,765	57,749	31,126	134,964	884,032
VA_jame	Sum of ACRES	772,337	70,587	4,374,144	552,017	-	738,810	6,507,894
	Sum of TP (LBS/YR)	969,867	39,979	103,176	549,156	1,150,284	653,417	3,465,879
	Sum of TN (LBS/YR)	4,347,480	615,486	7,783,824	2,514,805	12,016,178	7,016,534	34,294,307
VA_potm	Sum of ACRES	791,191	21,350	1,877,296	303,086	-	621,237	3,614,161
	Sum of TP (LBS/YR)	628,192	12,092	28,270	140,995	225,855	297,123	1,332,527
	Sum of TN (LBS/YR)	4,699,582	173,852	2,381,702	1,043,510	4,280,474	4,494,790	17,073,910
VA_rapp	Sum of ACRES	393,909	10,783	956,629	236,668	-	111,769	1,709,758
	Sum of TP (LBS/YR)	316,616	6,107	19,031	140,685	39,544	59,488	581,471
	Sum of TN (LBS/YR)	1,983,807	93,061	1,626,561	857,829	527,255	1,146,141	6,234,654
VA_york	Sum of ACRES	245,615	29,376	1,285,309	245,050	-	100,543	1,905,894
	Sum of TP (LBS/YR)	269,842	16,638	25,823	159,875	89,512	61,721	623,412
	Sum of TN (LBS/YR)	1,849,780	251,330	1,934,839	987,210	1,086,251	1,292,269	7,401,680
Total Sum of ACRES		2,257,957	136,033	8,594,702	1,356,512	-	1,582,406	13,927,610
Total Sum of TP (LBS/YR)		2,237,091	77,047	178,037	1,002,976	1,507,040	1,078,779	6,080,971
Total Sum of TN (LBS/YR)		13,394,506	1,166,302	13,840,691	5,461,103	17,941,283	14,084,699	65,888,583